
	<b>Centerwide System Level Procedure</b> ISO 9001 - Ames Research Center	Document #:	Rev.:
		<b>53.ARC.0009.4</b>	<b>2</b>
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REVISION HISTORY			
REV	Description of Change	Author	Effective Date
0	Initial release based on 7/98 DNV Audit and 6/98 Internal Audit (see DCR 98-032).	M. Hines	9/25/98
1	Clarifications based on 11/98 DNV Audit (DCR 98-064)	R. Serrano	12/18/98
2	Clarifications based on 11/00 DNV Audit CAR ARC-00886 (DCR 01-014)	J Weller	9/6/01

REFERENCE DOCUMENTS	
Document Number	Document Title
NPD 7120.4	Program/Project Management
NPG 7120.5	NASA Program and Project Management Processes and Requirements
53.ARC.0000	Ames Research Center Quality Manual, Sections 4.2, 4.4, and 4.9
53.ARC.0003	Acceptance and Amendment of Customer Agreements
53.ARC.0004.1	Project Management for the Design, Development, and Maintenance of Software
53.ARC.0004.2	Design and Development of Systems and Hardware
53.ARC.0004.3	Configuration Management
53.ARC.0006	Purchasing
53.ARC.0009.2	Management and Performance of Research
53.ARC.0013	Control of Nonconforming Products and Services
53.ARC.0014	Corrective and Preventive Action
53.ARC.0016	Quality Records
53.ARC.0019	Servicing

Documents referenced in this procedure are applicable to the extent specified herein.

## 1. Purpose

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This procedure establishes the requirements that the ARC Center Director and Program/Project Managers must meet in formulating, approving, implementing, and evaluating Programs and Projects managed at Ames Research Center (ARC) in accordance with the ARC Quality Manual.

## 2. Scope


This procedure establishes the management system for processes, requirements, and responsibilities for implementing NPD 7120.4 and NPG 7120.5. This management system governs the formulation, approval, implementation, and evaluation of Programs and Projects managed at ARC.

The requirements of this procedure may be tailored as appropriate based upon the size, complexity, and cost of a particular Program/Project effort. Any modifications of the process steps must be documented in the Program/Project Plan.


Projects not covered by this procedure shall be governed by other procedures (i.e., 53.ARC.0004.1, 53.ARC.0004.2, and/or 53.ARC.0009.2).

## 3. Definitions and Acronyms


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|---|--|
| 3.1. Approving Official                   | ARC individual authorized to approve the Customer Agreement  |
| 3.2. Customer                             | Any organization or individual that enters into a formal agreement with ARC for delivery of ARC products or services   |
| 3.3. Customer Agreement                   | Space Act Agreement, Interagency Agreement, Memorandum of Agreement, Memorandum of Understanding, Cooperative Agreement, Program or Project Plan, Research Plan/Proposal combined with a documented form of customer acceptance (e.g., customer letter of acceptance, NF 506A "Resources Authority Warrant," Military Inter-departmental Purchase Request (MIPR), etc.), or any other legal commitment entered into by ARC to deliver a product or service |
| 3.4. Governing Program Management Council | Group composed of NASA and/or Center Senior Management that assesses Program and Project planning and implementation and provides oversight and direction as appropriate   |
| 3.5. Level 1                              | Embodies Program Manager authority and implements the Program Plan   |

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|--|---|
| 3.6. Level 2                           | Embodies Project Manager authority and implements the Project Plan  |
| 3.7. Level 3                           | Embodies Task Manager authority and implements the Task Plan  |
| 3.8. Life Cycle                        | Series of events or operations which involve the design, development, production, operation, maintenance, support, and retirement of a Program or Project and its products  |
| 3.9. Life Cycle Cost                   | Total of the direct, indirect, nonrecurring, and other related expenses incurred, or estimated to be incurred, in the design, development, verification, production, operation, maintenance, support, and retirement of a system over its planned life span   |
| 3.10. Performing Organization          | Line organization responsible for performing technical tasks in the Program Plans and/or Project Plans. Determines how to implement a Program based on technical expertise. Performs all or part of the Program work, either for its own Center or as a Supporting Center contributing toward total Program activities. |
| 3.11. Program                          | Activity within an Enterprise having defined goals, objectives, requirements, funding, and consisting of one or more Projects, reporting to the NASA PMC, unless delegated to a Governing PMC   |
| 3.12. Program Management Council (PMC) | Senior Management group formed by the NASA Deputy Administrator (NASA PMC). Reviews Program performance relative to the Program (Level 1) Plan regarding cost, schedule, and technical accomplishment.  |
| 3.13. Program Manager                  | Individual that has the responsibility and authority for the administrative and technical direction of a Program. Responsibilities typically include planning, organizing, directing, controlling, and managing the Program.  |
| 3.14. Program Organization             | Program staff that is responsible for managing Programs and their implementation and that conducts the Program in accordance with the approved Program Plan   |

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3.15. Program Plan	Document that establishes the overall project baseline for implementation as well as agreements among the Enterprise Associate Administrator, responsible Center Director, and Program Manager
3.16. Project	Significant activities designated by a Program and characterized as having defined goals, objectives, requirements, Life Cycle Costs, a beginning, and an end.
3.17. Project Manager	Individual that has the responsibility and authority for the administrative and technical direction of a project. Responsibilities typically include planning, organizing, directing, controlling, and managing the project.
3.18. Project Plan	Document that establishes the overall baseline for implementation as well as the agreements among the Center Director, Program Manager, and the involved NASA Center managers
3.19. Responsible Manager	Person having the responsibility and authority to accomplish/implement a specific activity or process (includes organizational line managers, project managers, etc.)
3.20. Risk	Combination of: (1) the probability (qualitative or quantitative) that a program or project will experience an undesired event such as cost overrun, schedule slippage, safety mishap, or failure to achieve a needed technological breakthrough and (2) the consequences, impact, or severity of the undesired event if it were to occur
3.21. Risk Management	Organized, systemic, decision-making process that effectively identifies, analyzes, plans, tracks, controls, communicates, and documents risk to increase the likelihood of achieving program/project goals
3.22. Task Plan	Component of the Project Plan that provides a technical and resource path for Level 3 personnel in Performing Organizations to reach a specific series of milestones

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#### 4. Flowchart

There is no flowchart required for this document.

#### 5. Responsibilities

##### 5.1. Center Director (or designee) shall:

##### 5.1.1. As a Lead Center Director:

- serve as chairperson of the ARC Governing Program Management Council,
- support the Enterprise Associate Administrator in Program formulation and Program Plan approval,
- provide overall direction, control, and oversight of Program implementation,
- appoint the Program Manager and Project Managers,
- integrate institutional resources with Program needs, and
- develop and maintain Program/Project implementation policies and procedures, compliant with NPD 7120.4, NPG 7120.5, and the ARC Quality Manual.


##### 5.1.2. When supporting other Center Programs:

- support the Lead Center in Program formulation and review,
- serve as (or designate) chairperson of the ARC Governing PMC, consistent with the Lead Center Director responsibilities,
- approve Project Plans and oversee the Project,
- appoint Project Managers, and
- develop and maintain Program/Project implementation policies and procedures, compliant with NPD 7120.4, NPG 7120.5, and the ARC Quality Manual.

##### 5.2. Program Manager shall:

- plan the Program, including recommendation of Program objectives, requirements, implementation guidelines, budget, resources, and milestones, and preparation of Program Plans,
- allocate budgets to Projects,
- execute and oversee the Program Plan,
- approve Project Plans and associated changes, and
- review and report Program/Project performance.

##### 5.3. Project Manager shall:

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- prepare and maintain the Project Plan, specifications, schedules, and budgets, including establishment of support agreements,
- execute the Project Plan,
- support the Program management and integration, and
- report Project performance and status, including contract performance.

## 6. Procedure

### 6.1. General Requirements for Programs and Projects managed at ARC.

- 6.1.1. Program/Project Managers shall tailor processes and requirements consistent with Program and Project characteristics and risk factors such as size, safety, complexity, cost, and mission assurance. Approved Program/Project Plans shall document tailoring decisions and become the baseline requirements for the Program/Project.
- 6.1.2. Program/Project Managers shall identify customers and ensure that customers are informed and knowledgeable of Program and Project activities.
- 6.1.3. Program/Project Managers shall only undertake Programs and Projects that have clearly defined objectives and have a comprehensive definition of cost, schedule, and content commitments which are documented in approved Program/Project Plans.
- 6.1.4. Program/Project Managers shall apply risk management principles. Program and Project decisions shall be made on the basis of an orderly risk management effort, including the identification, assessment, mitigation, and disposition of risks throughout the Program/Project life cycle.
- 6.1.5. Program/Project Managers shall use ARC Quality System processes to implement Program/Project management at ARC.
- 6.1.6. Program/Project Managers shall define and document, in Program and Project Plans, how requirements for quality will be met **including the requirement for supplier audits**. Quality requirements include risk management and the processes for achieving safety and mission success.
- 6.1.7. Program and Project Plans shall be considered Customer Agreements and shall be handled in accordance with 53.ARC.0003. Program and Project Plans shall be considered Quality Records and shall be handled in accordance with 53.ARC.0016.

### 6.2. Standard Program/Project Processes

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6.2.1. The formulation process shall define a Program or Project concept and plan for implementation to meet mission objectives and technology goals.

The formulation process contains the following activities:

- Program/Project Planning – This activity results in the detailed definition of the Program/Project requirements and establishes Program/Project control to manage the Program/Project formulation process (see NPG 7120.5, sections 2.1.1 and 3.1.1).
- Program/Project System Analysis – This activity provides the systems analysis and Life Cycle Costing for concepts and options to meet Program objectives (see NPG 7120.5, sections 2.1.2 and 3.1.2).
- Program/Project Technology Requirements Synthesis – This activity assesses the technology requirements for feasibility, availability, technology readiness, opportunities for leveraging research, and new technologies (see NPG 7120.5, sections 2.1.3 and 3.1.3). This includes the identification and acquisition of any controls, processes, equipment (including inspection and test equipment), fixtures, resources, and skills that may be needed to achieve the required quality of deliverable products or services.
- Program/Project Technology and Commercialization Plans – This activity develops the technology options and partnering and commercialization options that satisfy the identified needs of candidate concepts (see NPG 7120.5, sections 2.1.4 and 3.1.4).
- Program/Project Operations and Business Opportunities – This activity identifies business opportunities for partnerships in the development and operations elements of the Program/Project (see NPG 7120.5, sections 2.1.5 and 3.1.5).
- Infrastructure and Plan Upgrades/Development – This activity minimizes Program Life Cycle Costs by assessing the infrastructure of NASA, other national and international agencies, industry, and academia needed to satisfy Program/Project requirements (see NPG 7120.5, sections 2.1.6 and 3.1.6).
- Capture Process Knowledge – This activity collects and evaluates process performance and identifies process lessons learned (see NPG 7120.5, sections 2.1.7 and 3.1.7).

The outcome of the formulation process is documented in the Program/Project Plans. Program Plans shall be developed in accordance with NPG 7120.5, Appendix E.3. Project Plans shall be developed in accordance with NPG 7120.5, Appendix E.4. Program/Project Managers shall utilize 53.ARC.0003, as appropriate, in formulating Plans and agreements.



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The output of the formulation process includes:

- Comprehensive definition of the Program or Project concept and Program/Project objectives, and
- Agreements, approaches, and Plans for meeting technical, budget, schedule, risk management, commercialization, acquisition, and related management requirements.

6.2.2. The approval process shall result in an authorization to proceed from formulation to implementation.

The outcome of the approval process includes:


- Commitment to support the Program or Project as specified in the Program Plan and Project Plan, and
- Authorization by the Approving Official for the Program or Project to proceed to the implementation process.
  - Program Plan Approval
  - Project Plan Approval

6.2.3. The implementation process shall provide for implementation of activities documented in approved Program/Project requirements and Plans. It delivers the Program and Project products and capabilities specified in the approved Program and Project requirements and Plans.

Each Program and Project shall execute the following:

- Program/Project Control – This activity develops, integrates, and provides direction and exercises control over budget, schedules, and procurement.
- Customer Advocacy – This activity maintains contact with customers and advocacy for customer objectives, plans, and requirements implementation.
- Requirement Management – This activity converts top-level requirements into implementation requirements and controls changes to the requirements. Changes to PCA and Level 1 milestones are controlled in accordance with Enterprise procedures and 53.ARC.0003. Changes to Level 2 and Level 3 milestones are controlled in accordance with 53.ARC.0004.3.
- Design, Develop, and Sustain Technology and/or Systems – This activity produces the specific Program systems, hardware, and software.
- Deliver Products and Services – This activity delivers the Program products and services, including science and technology.



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- Capture Process Knowledge – This activity collects and evaluates process performance metrics to identify process corrective actions and/or to communicate the lessons learned in using these processes.
- Quality Planning – This activity defines how the requirements for quality will be met. Quality Planning shall be consistent with all other Program/Project requirements and will be documented in the Program/Project Plan.

Program/Project managers and performing ARC organization(s) shall utilize the ARC Quality System to manage and control products and services delivered to ARC customers. Specifically, systems, hardware, and software shall be developed, controlled, and delivered in accordance with 53.ARC.0004.1, 53.ARC.0004.2, and/or 53.ARC.0004.3; research shall be performed in accordance with 53.ARC.0009.2; procedures 53.ARC.0013 and 53.ARC.0014 shall be utilized for reporting nonconforming products and problems requiring corrective or preventive actions; and where Programs or Projects have requirements for servicing (i.e., sustaining engineering) these requirements shall be documented in the appropriate Program/Project plans in accordance with 53.ARC.0019.


- 6.2.4. The evaluation process shall provide an independent assessment of the continuing ability of the Program or Project to meet its technical and programmatic commitments and to provide value-added assistance to the Program/Project Managers.

All Programs and Projects shall execute an evaluation process. The Program/Project Plan shall specify the methods, including types, levels, and schedules, for reviews and assessments.

The outcome of the evaluation process is a set of conclusions regarding the ability to meet commitments and recommendations for proceeding with, modifying, or terminating the Program or Project.

Consistent with guidance from NPD 7120.4 and NPG 7120.5, ARC shall convene a Governing Program Management Council to review Programs managed by ARC. The frequency of reviews shall be called out in the Program Plan and shall be held at least once per Program year. Activities subject to review are all ARC Program and Project activities. The review shall be noticed with a formal agenda and shall be documented with minutes where actions are logged and tracked. The review will include at a minimum the following agenda items:

- Programmatic issues (i.e. schedules, cost, resources, major milestones)
- Technical approaches/plans

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- Current technical accomplishments
- Key technical issues being addressed
- Issues/concerns (e.g., risk status)

The process of approval and authorization to amend the Program or Project Plan consistent with any recommendations from the Governing Program Management Council is fully described in the Program or Project Plan in accordance with NPG 7120.5.

### 6.3. Program/Project Management System Requirements

Program and Project Managers are responsible for meeting management system requirements defined below.

6.3.1. The resource management process defines requirements for management of the resources supporting the Program/Project management. This includes:

- Financial Management (see NPG 7120.5, section 4.1.1),
- Life Cycle Cost Management and Accounting (see NPG 7120.5, section 4.1.2)
- Information Technology Management (see NPG 7120.5, section 4.1.3)


6.3.2. The risk management process identifies risks; analyzes their impact and prioritizes them; develops and carries out plans for risk mitigation, acceptance, or other action; tracks risks and the implementation of mitigation plans; supports informed, timely, and effective decisions to control risks and mitigation plans; and assures that risk information is communicated among all levels of a Program/Project. This includes the following activities:

- Risk Management Planning (see NPG 7120.5, section 4.2.2.a)
- Risk Management Process (see NPG 7120.5, section 4.2.2.b)
- Risk Management Functions (see NPG 7120.5, section 4.2.2.c)

6.3.3. The performance management process defines the mechanisms for tracking and maintaining successful performance. This includes the following:

- Earned Value Management (see NPG 7120.5, section 4.3.1)
- Performance Assessment (see NPG 7120.5, section 4.3.2)
- Schedule Management (see NPG 7120.5, section 4.3.3)
- Work Breakdown Structure (see NPG 7120.5, section 4.3.4)
- Program and Project Management Process Metrics (see NPG 7120.5, section 4.3.5)

6.3.4. The acquisition management process defines how ARC accomplishes its mission by means other than in-house resources. This includes the

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following:

- Acquisition (see NPG 7120.5, section 4.4.1 and 53.ARC.0006)
- Identify Requirements/Strategizing Implementation (see NPG 7120.5, section 4.4.2)
- Executing Contracts and Non-procurement Instruments (see NPG 7120.5, section 4.4.3)
- Monitoring Performance (see NPG 7120.5, section 4.4.4)

6.3.5. The safety and mission success process defines the requirements for effective safety and mission success within Programs and Projects. This includes, but is not limited to, the following:

- Safety and Mission Success (see NPG 7120.5, section 4.5.1)
- Nuclear Launch Safety (see NPG 7120.5, section 4.5.2)
- Application of Lessons Learned (see NPG 7120.5, section 4.5.3)


#### 6.4. Problem Resolution

The Program Organization has the responsibility to take action to resolve problems as they arise in meeting Level 1 or Level 2 milestones. Whenever possible, lateral levels in the Performing and Program Organizations consult and make every reasonable attempt to find solutions. This same conflict resolution method applies no matter where the Performing Organization resides.


6.4.1. The Performing Organization (at all levels) shall immediately report any technical problems to their line manager and propose a workable resolution.

- 6.4.1.1. If the proposed solution meets objectives, fits within the budget, and can be achieved on schedule, the Performing Organization advises the Program Organization but has the latitude to execute that solution.
- 6.4.1.2. If the proposed solution does not fit objectives, schedule, or budget, the Performing Organization must resolve the issue with the Program Organization.
- 6.4.1.3. Corresponding lateral levels in the Performing and Program Organizations consult with each other and make every reasonable attempt to find solutions. If the Program and Performing Organizations cannot agree, each side escalates the problem up one level (in parallel) to their respective supervisors.


6.4.2. The Program Manager shall be empowered to make decisions to resolve any conflicts regarding a programmatic (non-technical) Program shortfall.

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- 6.4.2.1. If the ARC Performing Organizations do not agree with the Program Manager's decision, they may escalate an appeal up their respective management chains to the Center Director (who has ultimate authority in all Program matters).
- 6.4.2.2. The Program Manager will inform the ARC Director of proposed solutions to problems impacting Level 1 milestones.
- 6.4.2.3. The Program Manager will consider the best interest of the Program and the Enterprise when making unilateral changes to the contract (including funding and the scope of reduced work) when problems occur and obligations are not being met.
- 6.4.2.4. The Performing Organization's Director can appeal to the Center Director if he or she believes that a scope reduction will adversely impact the Center significantly or that better alternatives exist to achieve the organizational goal.
- 6.4.2.5. The Center Director will evaluate the situation and decide on the most feasible method to achieve the organizational goal.
- 6.4.3. The Program Manager can redirect Level 2 funding without the Performing Organization's Director's approval, provided this will not alter the intent of Level 1 milestones (i.e., not violate the contract with the Performing Organization's Directorate).
- 6.4.4. The Program Manager has four options to solve funding problems that impact a Level 2 milestone:
  - 6.4.4.1. Apply additional funding to the Project within a Program.
  - 6.4.4.2. Approve redirection of any available funding within Level 2. The Program Manager expects the Level 2 Project Manager to consider this option first, as appropriate.
  - 6.4.4.3. Redirect funding from another Level 2 activity. By exercising this option, the Program Manager may be failing to comply with a customer agreement negotiated with the line organization of the other activity, and so lose resources. In spite of this, the Program Manager has authority to redirect funds to meet the overall objectives of the Program and the Enterprise.

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- 6.4.4.4. Terminate an under-performing or lower-priority Level 2 task. The Program Manager should pursue all avenues of discussion and problem resolution before authorizing this termination and should exercise the authority to terminate an under-performing Level 2 task only as a last resort.

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## 7. Metrics

There are no metrics required for this document.

## 8. Quality Records

The following Quality Records shall be generated and managed in accordance with 53.ARC.0016.

Required Record	Custodian
Program Plan	Program Manager
Project Plan	Project Manager

## 9. Form(s)

There are no forms required for this document.